For entrants in AY 2023

Name of School (Program)　School of Engineering Cluster 3 (Applied Chemistry, Biotechnology and Chemical Engineering)

Program name (Japanese)	
(English)	Program of Biotechnology

1. Academic Degree to be Acquired

Bachelor's degree in engineering

2. Overview

(1) Overview of "English-based Bachelor's Degree Program"

This program aims to foster and produce future members of a global society who have the knowledge to be innovative, creative, take leadership, and possess language abilities that will help them play an important role in the international world.

This program focuses specifically on producing individuals who are capable of addressing various global issues from an engineering perspective and contribute to the creation of new and valuable solutions that are significant to both the industrial and academic societies.

Students enrolled in the program will begin the curriculum from the first semester of their first year.

In the second year, students will set off on their major programs and take the designated courses which are offered at each cluster. Major program overview is as (2).

(2) Program overview of "Program of Biotechnology".

In order to contribute to the advancement of the key industries that will play a role in the next generation, such as medicine, food, and environment, this program aims at developing engineers and researchers that possess professional expertise and technical skills in the elucidation and utilization of biological molecules and living organisms. Therefore, this program establishes a curriculum through which students can organically and systematically acquire comprehensive knowledge of the basic mechanisms of life and technical skills in the most-advanced fields, such as gene, protein, carbohydrate, and lipid engineering; microorganism, animal, and plant engineering; biochemical engineering; bioinformatics engineering; environmental biotechnology; immunology; and brewing technology. Students can also acquire the different abilities required for researchers and engineers, such as the ability to think logically, the ability to plan and conduct experiments, the ability to explain data analysis, the ability to discover and resolve the problems, and the ability to deal with practical issues. This program awards the Type-1 High School Teaching License (Industry) to students who have taken the required courses. Graduates gain employment and work actively for corporations in the pharmaceutical, food, brewing, environmental, and chemical industries, or in public research institutions. Graduates can go to graduate school (Graduate School of Integrated Sciences for Life) to obtain a higher degree of education and undertake research.

3. Academic Awards Policy (Policy for awarding degrees and goal of the program)

The Program of Biotechnology nurtures professionals that have acquired the basic knowledge, skills, and attitudes needed to work as bioengineering researchers and engineers and, further, to embrace opportunities for creativity in scientific thought.

Therefore, this program offers education aimed at cultivating a broad range of general knowledge, a global perspective to seek peace, a general sense of judgment, and a well-rounded character. The program awards a bachelor's degree in engineering to students who have completed sufficient liberal arts education and specialized education to achieve the following goals from (A) to (E), as well as the number of credits necessary to meet the standard of the course.

(A) The ability to understand the relationship between people, society, nature, and engineering, and to demonstrate multifaceted and logical thinking skills

(B) The ability to understand basic natural science

(C) The ability to acquire basic knowledge of biotechnology and biological science, and to expand it widely to applied technology

(D) The ability to come up with conceptual ideas and to implement ideas, as well as the ability to transmit learning and research results

(E) The ability to adapt to the highly sophisticated information society with high level communication skills

4. Curriculum Policy (Policy for Preparing and Implementing the Curriculum)

To achieve the goals from (A) to (E) set by this program, the Program of Biotechnology organizes and implements a curriculum in which liberal arts education and specialized education are closely connected. After acquiring basic academic abilities and knowledge in liberal arts education subjects, students must learn the specialized fields of engineering and biotechnology. Students mainly study these subjects until the first and second terms of the second year, and then after the third and fourth terms of the second year, when students are assigned to the program, they mainly study specialized subjects. Learning specialized basic subjects before being assigned to the program is effective in raising awareness of students' field of specialization, and in developing incentives for learning. Furthermore, receiving lectures by the faculties in charge of programs other than the Program of Biotechnology (Program of Chemical Engineering,Program of Applied Chemistry) provides students with knowledge about surrounding fields.

In the curriculum described above, teaching and learning will be implemented by utilizing active learning and online classes, depending on the delivery methods of the program, such as lectures and seminars.

In addition to strict grading using the standards clearly outlined in the syllabus, learning outcomes are evaluated based on the degree to which the goals set by the educational program are achieved.

Knowledge and Abilities

Cultivation of understanding about the relationship between people, society, nature, and engineering, as well as an ethical outlook, which forms the basic knowledge that researchers and engineers are required to possess (Goal A). This is obtained through mastery of liberal arts education subjects, "Introductory Seminar for First-Year Students", "Peace Science Courses" ,"Introduction to University Education", "Information Subjects" and specialized basic subjects, " Introduction to Applied Chemistry, Chemical Engineering and Biotechnology", and " Introduction to Fundamental Industry" to be offered at the first year.

Basic knowledge of mathematical theory, physics theory, and experimental methods required of researchers and engineers in natural science (Goal B). This is obtained through mastery of mathematical fundamental subjects such as "Calculus" and "Linear Algebra" and fundamental physics subjects such as "General Mechanics I II" and "Experimental Methods and Laboratory Work in Physics" to be offered in the first year.

General understanding of biotechnology, life science, chemistry, and the basic knowledge required of experts in biotechnology (Goal B, C). This is obtained through mastery of specialized basic subjects, "Basic Life Science", "Basic Organic Chemistry I", "Basic Inorganic Chemistry" and "Basic Environmental Sciences" to be offered in the first year.

Mathematical method required of experts in biotechnology (Goal B). This is obtained through mastery of specialized basic subjects, "Applied Mathematics I II", and "Probability and Statistics" to be offered from the third and fourth term of the first year through the second year.

The expertise and grasp of concepts required of researchers and engineers in biotechnology (Goal C). This is obtained through mastery of the specialized subjects of the Program of Biotechnology such as "Microbiology I II", "Molecular Biology I II III", "Enzyme Chemistry", and "Biochemical Engineering" to be offered from the third and the fourth term of the second year through the fourth year.

Abilities and Skills

The ability to conduct experiments to resolve issues and problems that arise, and the ability to examine and resolve problems using experimental outcomes and related materials (Goal C, D, E). This is obtained through mastery of experimental subjects closely related to biotechnology, such as " Experimental Methods and Laboratory Work in Biology", "Basic Experiments in Chemistry", and "Training of Biotechnology I II"

The ability to make action plans on one's own initiative in response to practical issues and challenges, to make adjustments, and to resolve problems and challenges by using basic and specialized knowledge and methods (Goal C, D, E). These are obtained through mastery of "Graduation Thesis" to be offered in the fourth year.

Overall Abilities

The ability to organize and analyze information from the literature to discover and resolve practical problems and challenges, and the ability to logically make research plans and carry them out (Goal C, D, E). These are obtained through mastery of "Group Discussion of Current Biotechnology Topics" to be offered in the third year and "Graduation Thesis" to be offered in the fourth year.

The ability to organize research results and write logically, including about the significance and validity of the obtained outcome, and to prepare presentation data, present it, and discuss it verbally in an easy-to-understand manner (Goal E). These are obtained through mastery of "Group Discussion of Current Biotechnology Topics" to be offered in the third year, and "Graduation Thesis" to be offered in the fourth year.

Teamwork ability, leadership ability, and communication ability in group work (Goal E). These are obtained through mastery of "Basic Experiments in Chemistry", and "Training of Biotechnology I II" to be offered from the third and fourth term of the second year though the third year, and through "Group Discussion of Current Biotechnology Topics" to be offered in the third year.

The ability to read, write, and converse in the English language necessary for conducting research (Goal E). This is obtained through mastery of "Communication Basic I II" in the liberal arts education subjects, "Technical English" to be offered in the third and the fourth terms of the second year, and "Graduation Thesis" to be offered in the fourth year.

5. Program Timing and Acceptance Conditions

When to start the program:

The English-based Bachelor's Degree programs begin in the first semester of the first year. Enrollment in Program of Biotechnology occurs in the second semester of the second year.

Cluster 3 offers distinctive education that organically integrates fields related to chemistry, biotechnology, and processes. Specifically, it aims at developing professionals that possess a wide range of basic knowledge about the development of new functional substances and materials, the biotechnology of plants, animals, and microbes, the design and control of chemical process, environmental preservation and bioremediation, and the development of resources and energy, as well as having a high level of expertise and technical skill in a harmonious way. To achieve this aim, in addition to the common subjects and a wide range of specialized basic education, three programs are prepared that provide specialized education about chemistry, biotechnology and processes. These are the Program of Applied Chemistry, the Program of Biotechnology, and the Program of Chemical Engineering. Registration to these three programs is to be made in the second semester of the second year, so that students are able to choose the suitable specialized field or program while acquiring a wide range of specialized basic knowledge.

Requirements of Acquired Credits

In order to be assigned to each program, students must acquire 16 or more credits out of a total of 18 credits in compulsory specialized basic subjects (excluding Basic Chemical Experiment and Technical English) and must acquire an overall total of 60 or more credits (including in liberal arts education subjects).

Program Quota

An upper limit is set f

program, all the teachers of this program work together in cooperation with each other to carry out the system.

(2) Program Assessment

Criteria for program assessment:

Evaluation outcome of attainment levels against goals

Requests from students and demands of society

Evaluation outcome of self-assessment by faculties

Method of assessment (connection with class evaluation to be described)

In addition to attainment levels evaluation summary sheet completed by the Education and Student Evaluation Committee, questionnaires by students and graduates, and self-assessment evaluation by faculties, an external evaluation will be conducted.

Procedure on giving feedback to students

In the case of problems with class subjects, faculties deal with these problems after taking into account the learning conditions of each individual student. The tutors or the Educational Improvement Committee members handle matters comprehensively, which is reflected in the improvement of the program through discussions in the committee.

Cluster 3 (Applied Chemistry, Biotechnology and Chemical Engineering

◎ Required subject (period of registration specified)
○ Compulsory elective subject (any of these subjects shall be registered)
△ Free elective subject (any of these subjects shall be registered)
Year in which the subject is taken(※The lower figure means semester)
(Note 1)

	Subject Type	Required No. of credits	Class subjects	No. of credits	Type of course registration	1st grade Spring 1T	1st grade Spring 2T	1st grade Fall 3T	1st grade Fall 4T	2nd grade Spring 1T	2nd grade Spring 2T	2nd grade Fall 3T	2nd grade Fall 4T	3rd grade Spring 1T	3rd grade Spring 2T	3rd grade Fall 3T	3rd grade Fall 4T	4th grade Spring 1T	4th grade Spring 2T	4th grade Fall 3T	4th grade Fall 4T
Liberal Arts Education Subjects I	Peace Science Courses	2		2	Compulsory elective		○														
Basic Courses in University Education	Introduction to University Education	2	Introduction to University Education	2	Required	◎															
		2	Introductory Seminar for First-Year Students	2	Required	◎															
	Advanced Seminar	0		1	Free elective			△	△												
	Area Courses	4	Courses in Arts and Humanities/Social Sc	2	Compulsory elective	○		○													
		4	Courses in Natural Sciences	2			○		○												
Foreign Languages	English (Note2・3) Basic English Usage		Basic English Usage I	1		◎	◎														
			Basic English Usage II	1				◎	◎												
	English (Note2・3) Communication II		Communication IA	1		◎	◎														
			Communication IB	1		◎	◎														
			Communication IIA	1				◎	◎												
			Communication IIB	1				◎	◎												
	Initial Foreign Languages (Select one language from German, French, Spanish, Russian, Chinese, Korean and Arabic)	2	1 subjects from Basic language I	1	Compulsory elective	○															
			1 subjects from Basic language II	1			○														
	Information and Data Science Courses	2	Introduction to Information and Data Sciencies	2	Required																
	Health and Sports Courses	2		1or2	Compulsory elective	○	○	○	○												
	Basic Subjects	15	Calculus I	2	Required	◎															
			Calculus II	2				◎													
			Linear Algebra I	2			◎														
			Linear Algebra II	2					◎												
			General Mechanics I	2			◎														
			General Mechanics II	2					◎												
			Experimental Methods and Laboratory Work in Physics I	1						◎											
			Experimental Methods and Laboratory Work in Physics II	1							◎										
			Seminar in Basic Mathematics I	1			◎														
			Seminar in Basic Mathematics II	1					○												
		1	Experimental Methods and Laboratory Work in Biology I (Note 5)	1	Compulsory elective			○													
			Experimental Methods and Laboratory Work in Biology II	1					○												
			Basic Electromagnetism	2					○												
	Free elective subjects	2	From all Subject Type		Free elective	△	△	△	△	△	△	△	△								
	No. of credits required for graduation	44																			

Note 1: When students fail to acquire the credit during the term or semester marked with ◎, ○, △ in the boxes for the year in which the course is taken, they can take the course in subsequent terms or semesters. Depending on class subject, courses may be offered in semesters or terms different from those scheduled. Please be sure to check the time schedule for Liberal Arts Education subjects to be issued every school year.

Note 2: The credit obtained by mastery of "English-speaking Countries Field Research" or self-directed study of "Online Seminar in English A・B" cannot be counted towards the credit necessary for graduation. The credit obtained by Overseas Language Training can be recognized as Communication Ⅰ or Ⅱ if application is made in advance. For more details, please refer to the article on English in Liberal Arts Education in

Note 3: We have a recognition of credit system for foreign language proficiency tests. For more details, please refer to the article on Foreign Language in Liberal Arts Education in the student handbook.

Note 4: Students must take both「Experimental Methods and Laboratory WorkI **in Physics I**(1credit)」and「Experimental Methods and Laboratory WorkII in **Physics II**(1credit)」.

Note 5: Experimental Methods and Laboratory Work in Biology I should basically be taken together with Experimental Methods and Laboratory Work in Biology II. Person who took Methods and Laboratory Work in Biology I can take Experimental Methods and Laboratory Work in Biology II.

Cluster 3　Specialized Basic Subjects

◎Required

Class Subjects	Credits	Type of course registration			Class Hours/ Week																note
		Applied Chemistry	Biotechnology	Chemical enneenering	1st grade				2nd grade				3rd grade				4th grade				
					Spring		Fall		Spring		Fall		Spring		Fall		Spring		Fall		
					1T	2T	3T	4T	1T	2T	3T	4T	1T	2T	3T	4T	1T	2T	3T	4T	
Applied Mathematics I	2						4														
Applied Mathematics II	2								4												
Applied Mathematics III	2													4							
Basic Engineering Computer Programming	2								4												
Probability and Statistics	2												4								
Technical English	1											4									
Basic Environmental Sciences	2						4														
Chemical Stoichiometry	2									4											
Basic Organic Chemistry I	2						4														
Basic Organic Chemistry II	2							4													
Physical Chemistry I	2									4											
Biochemistry I	2									4											
Basic Experiments in Chemistry	4										12	12									
Basic Inorganic Chemistry	2						4														
Analytical Chemistry	2								4												
Basic life science	2							4													
Introduction to Applied Chemistry, Chemical Engineering and Biotechnology	2									4											
Introduction to Fundamental Industry	2									4											

Cluster 3　Specialized Subjects
(Program of Biotechnology)

Required subjects
Compulsory Elective subjects

Class Subjects	Credits	Type of course registration	Class Hours/ Week																Note
			1st grade				2nd grade				3rd grade				4th grade				
			Spring		Fall		Spring		Fall		Spring		Fall		Spring		Fall		
			1T	2T	3T	4T	1T	2T	3T	4T	1T	2T	3T	4T	1T	2T	3T	4T	
Training of Biotechnology I	4										12	12							
Experiments on Biotechnology II	4												12	12					
MicrobiologyI	2									4									
MicrobiologyII	2											4							
Molecular biology I	2									4									
Molecular biology II	2											4							
Biochemistry II	2								4										
BiochemistryIII	2										4								
Enzyme Chemistry	2								4										
Bioorganic Chemistry	2	○									4								
Fermentation Technology	2										4								
Biochemical Engineering	2											4							
Glycotechnology & Immunotechnology	2													4					
Molecular BiologyIII	2													4					
Genetic and protein engineering	2	○												4					
Molecular Bioinformatics	2	○											4						
Biotechnology	2												4						
Group Discussion of Current Biotechnology Topics	2												2	2					
FoodProcess Engineering I	1											2							
Food Process Engineering II	1													2					
FermentationProcess Engineering I	1														1	1			
Fermentation process engineeringII	2											4							
Fermentation Process Engineering III	1													2					
Physical Chemistry II	2								4										
Chemical Kinetics	2											4							
Organic Structural Analysis	2									4									
Advanced Organic Chemistry IV	2												4						
Chemical Engineering Exercise I	2								4	4									
Chemical Engineering Fundamentals	2								2	2									
Green Technology	2												4						
Recycling engineering	2													4					
Graduation Thesis	5																		

Sheet 2

Academic Achievements in Biotechnology Program

The Relationship between Evaluation Items and Evaluation Criteria

Academic Achievements			Evaluation Criteria		
Evaluation Items			H		
Knowledge and Understanding			Being able to fully understand mathematics and engineering.	differences between engineering and other areas and being able to understand mathematics and standard level.	Being able to well understand the relations and differences between engineering areas, physics, mathematics and other areas and take various consideration to the standard level.
	(2)	Acquisition of basic knowledge (achievement target C)	Being able to well understand the basic and advanced science target for basic natural		Being able to well understand the basic and advanced
			Being able to understand chemistry, applied biology, advanced mathematics, and applied biology, basic	Being able to understand chemistry, applied biology, basic	Being able to well demonstrate the ability described on the left.
Abilities and Skills	(1)	Acquisition of basic knowledge (achievement target B)	Being able to demonstrate the ability to think logically, to plan and carry out research and to analyze data with a plan, ability to analyze data and explanation.	Being able to demonstrate standard level abilities to think logically, to plan and carry out research and to analyze data.	
	(1)	Cultivation of ability creating concept and solving problesms (achievement target D)			
Overall Abilities			Being able to display abilities, required for biotechnologists, such as to make plan and carry out research, to demonstrate research outcome, to discuss, and to solve problems.	To be able to demonstrate standard level abilities to make plan and carry out research, to show outcomes and to solve problems.	Being able to demonstrate the ability described on the left.
	(2)	Cultivation of communication skills (achievement target E)	Being able to show logical writing abilities, information transmission abilities to domestic and overseas, debating and information utilization.	To be able to demonstrate standard level abilities to make plan and carry out research, to show outcomes and to solve problems.	Being able to demonstrate the ability described on the left.

Placement of the Liberal Arts Education in the Major Program

Liberal Arts Education in this program assumes the role of establishing the academic foundation on which the specialized education will be built. It respects a voluntary, self-reliant attitude and cultivates scientific thinking based on information gathering abilities, analytical abilities, and critical thinking abilities. It establishes perspectives that make it possible to provide insight on the inner nature of things and their background from a wide broad viewpoint, and enhances linguistic abilities to the level appropriate for living as a global citizen. It also strengthens interest in peace, and integrates a broad range of knowledge into a body of knowledge that will be truly useful in solving problems. It cultivates the ability to explore and promote cross-disciplinary /comprehensive research that goes beyond the established frameworks of biotechnology.

Relationships between the evaluation items and class subjects

Subject type	Class subjects	credits	Type of course registration 区分	Period	Evaluation items												Total weighted values of evaluation items in the subject
					Knowledge and Understanding						Abilities and Skills		Comprehensive Abilities				
					(1)		(2)		(3)		(1)		(1)		(2)		
					Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Weighted values of evaluation items in the subject	Weightsed values of evaluation items	
Liberal Arts Education	Introductory Seminar for First-Year Students	2	Required	1semsester	40	1							40	1	20	1	100
Liberal Arts Education	Introduction to University Education	2	Required	1semsester	100	1											100
Liberal Arts Education	Peace Science Courses	2	Elective	1semsester	100	1											100
Liberal Arts Education	Area Courses	8	Elective	1semsester	100	1											100
Liberal Arts Education	Basic English Usage I	1	Required	1semsester											100	1	100
Liberal Arts Education	Basic English Usage II	1	Required	1semsester											100	1	100
Liberal Arts Education	CommunicationI	1	Required	1semsester											100	1	100
Liberal Arts Education	Communication I	1	Required	1semsester											100	1	100
Liberal Arts Education	Communication II	1	Required	2semsester											100	1	100
Liberal Arts Education	Communication II	1	Required	2semsester											100	1	100
Liberal Arts Education	Basic language I	1	Required	1semsester	100	1											100
Liberal Arts Education	Basic language II	1	Required	1semsester	100	1											100
Liberal Arts Education	Information and Data Science Courses	2	Required	1semsester											100	1	100
Liberal Arts Education	Information and Data Science Courses	2	Required	1semsester	100	1											100
Liberal Arts Education	CalculusI	2	Required	1semsester			100	1									100
Liberal Arts Education	CalculusII	2	Required	2semsester			100	1									100
Liberal Arts Education	Linear AlgebraI	2	Required	1semsester			100	1									100
Liberal Arts Education	Linear AlgebraII	2	Required	2semsester			100	1									100
Liberal Arts Education	General Mechanics I	2	Required	1semsester			100	1									100
Liberal Arts Education	General Mechanics II	2	Required	2semsester			100	1									100
Liberal Arts Education	Experimental Methods and Laboratory Work in Physics I・II	2	Required	3semsester			50	1			30	1	20	1			100
Liberal Arts Education	Seminar in Basic Mathematics I	1	Elective	1semsester			100	1									100
Liberal Arts Education	Seminar in Basic Mathematics II	1	Elective	2semsester			100	1									100
Liberal Arts Education	Experimental Methods and Laboratory Work in Biology I・II	2	Elective	2semsester							80	1	20	1			100
Liberal Arts Education	Basic Electromagnetism	2	Elective	2semsester			100	1									100
Specialized Education	Applied Mathematics I	2	Required	2semsester					100	1							100
Specialized Education	Applied Mathematics II	2	Required	3semsester					100	1							100
Specialized Education	Applied Mathematics III	2	Elective	5semsester					100	1							100
Specialized Education	Probability and Statistics	2	Elective	5semsester					100	1							100
Specialized Education	Technical English	1	Required	4semsester					20	1					80	1	100
Specialized Education	Basic Engineering Computer Programming	2	Required	3semsester					100	1							100
Specialized Education	Basic Environmental Sciences	2	Elective	2semsester	60	1			40	1							100
Specialized Education	Chemical Stoichiometry	2	Required	3semsester					100	1							100
Specialized Education	Basic Organic Chemistry I	2	Required	2semsester					100	1							100
Specialized Education	Basic Organic Chemistry II	2	Elective	2semsester					100	1							100
Specialized Education	Physical Chemistry I	2	Required	3semsester					100	1							100
Specialized Education	Biochemistry I	2	Required	3semsester					100	1							100
Specialized Education	Basic Experiments in Chemistry	4	Required	4semsester							80	1	20	1			100
Specialized Education	Basic Inorganic Chemistry	2	Required	2semsester					100	1							100
Specialized Education	Analytical Chemistry	2	Required	3semsester					100	1							100
Specialized Education	Basic life science	2	Elective	2semsester	40	1			60	1							100
Specialized Education	Introduction to Applied Chemistry, Chemical Engineering and Biotechnology	2	Elective	3semsester	40	1			60	1							100
Specialized Education	Introduction to Fundamental Industry	2	Elective	3semsester	40	1			60	1							100
Specialized Education	Training of Biotechnology I	4	Required	5semsester							60	1	20	1	20	1	100
Specialized Education	Experiments on Biotechnology II	4	Required	6semsester							60	1	20	1	20	1	100
Specialized Education	MicrobiologyI	2	Required	4semsester					100	1							100
Specialized Education	MicrobiologyII	2	Required	5semsester					100	1							100
Specialized Education	Molecular biology I	2	Required	4semsester					100	1							100
Specialized Education	Molecular biology II	2	Required	5semsester					100	1							100
Specialized Education	Biochemistry II	2	Required	4semsester					100	1							100
Specialized Education	BiochemistryIII	2	Required	5semsester					100	1							100
Specialized Education	Enzyme Chemistry	2	Elective	4semsester					100	1							100
Specialized Education	Bioorganic Chemistry	2	Elective	5semsester					100	1							100
Specialized Education	Fermentation Technology	2	Required	5semsester					100	1							100
Specialized Education	Biochemical Engineering	2	Required	5semsester					100	1							100

Subject type	Class subjects	credits	Type of course registration 区分	Period	Evaluation items												Total weighted values of evaluation items in the subject
					Knowledge and Understanding						Abilities and Skills		Comprehensive Abilities				
					(1)		(2)		(3)		(1)		(1)		(2)		
					Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Weighted values of evaluation items in the subject	Weightsed values of evaluation items	Weighted values of evaluation items in the subject	Weightsed values of evaluation items	
Specialized Education	Glycotechnology & Immunotechnology	2	Elective	6semsester					100	1							100
Specialized Education	Molecular BiologyIII	2	Elective	6semsester					100	1							100
Specialized Education	Genetic and protein engineering	2	Elective	6semsester					100	1							100
Specialized Education	Molecular Bioinformatics	2	Elective	6semsester					100	1							100
Specialized Education	Biotechnology	2	Elective	6semsester					100	1							100
Specialized Education	Group Discussion of Current Biotechnology Topics	2	Required	6semsester	40	1							40	1	20	1	100
Specialized Education	FoodProcess Engineering I	1	Elective	5semsester	20	1			80	1							100
Specialized Education	Food Process Engineering II	1	Elective	6semsester	20	1			80	1							100
Specialized Education	FermentationProcess Engineering I	1	Elective	7semsester	20	1			80	1							100
Specialized Education	Fermentation process engineeringII	2	Elective	5semsester	20	1			80	1							100
Specialized Education	Fermentation Process Engineering III	1	Elective	6semsester	20	1			80	1							100
Specialized Education	Physical Chemistry II	2	Elective	4semsester					100	1							100
Specialized Education	Chemical Kinetics	2	Elective	5semsester					100	1							100
Specialized Education	Organic Structural Analysis	2	Elective	4semsester					100	1							100
Specialized Education	Advanced Organic Chemistry IV	2	Elective	6semsester					100	1							100
Specialized Education	Chemical Engineering Exercise I	2	Elective	4semsester					100	1							100
Specialized Education	Chemical Engineering Fundamentals	2	Elective	4semsester					100	1							100
Specialized Education	Green Technology	2	Elective	6semsester					100	1							100
Specialized Education	Recycling engineering	2	Elective	6semsester					100	1							100
Specialized Education	Graduation Thesis	5	Required	7,8semsester	10	1					50	1	20	1	20	1	100

Basic language

CalculusI(◎)

Linear AlgebraI (◎)

(2T)General Mechanics I(◎)

Seminar in Basic Mathematics I( )

Basic life science I(△)

CalculusII(◎)

Linear AlgebraII(◎)

(3T)General Mechanics II(◎)

Seminar in Basic Mathematics II ( )

T)Basic Electromagnetism (

Introduction to Fundamental Industry

Experimental Methods and Laboratory Work in Physics I) (

Experimental Methods and Laboratory Work in Biology I

Basic Organic Chemistry II

Applied Mathematics I (◎)

Basic life science(△)

Basic Environmental Sciences(△)

Basic Organic Chemistry I( )

Basic Inorganic Chemistry( )

Basic Engineering Computer Programming

Applied Mathematics II (◎)

Physical Chemistry I(◎)

Chemical Stoichiometry(◎)

Biochemistry I(◎)

Analytical Chemistry(◎)

Introduction to Applied Chemistry, Chemical Engineering and Biotechnology

Introduction to Fundamental Industry(△)

Technical English(◎)

Physical Chemistry II ( )

MicrobiologyI (◎)

Molecular biology I (◎)

Biochemistry II (◎)

Enzyme Chemistry ( )

Chemical Engineering Fundamentals ( )

Chemical Engineering Exercise I (○)

Organic Structural Analysis(△)

Probability and Statistics (△)

Applied Mathematics III ( )

MicrobiologyII (◎)

Molecular biology II (◎)

BiochemistryIII(◎)

Bioorganic Chemistry( )

Fermentation Technology ( )

Biochemical Engineering(◎)

Chemical Kinetics (○)

FoodProcess Engineering I ( )

Fermentation process engineeringII ( )

Glycotechnology & Immunotechnology(○)

Molecular BiologyIII

Genetic and protein engineering

Molecular Bioinformatics(○)

Biotechnology(○)

Advanced Organic Chemistry IV ( )

Green Technology(△)

Recycling engineering (△)

Food Process Engineering II(△)

Fermentation Process Engineering III( )

Experimental Methods and Laboratory Work in Biology I

Basic Experiments in Chemistry(◎)

Training of Biotechnology I(◎)

Experiments on Biotechnology II(◎)

Graduation Thesis(◎)

Graduation Thesis(◎)

Introductory Seminar for First-Year Students(◎)

Experimental Methods and Laboratory Work in Biology I-Ⅱ(△)

Basic Experiments in Chemistry(◎)

Training of Biotechnology I(◎)

Experiments on Biotechnology II(◎)

Graduation Thesis(◎)

Graduation Thesis(◎)

Group Discussion of Current Biotechnology Topics(◎)

Introductory Seminar for First-Year Students(◎)

Communication IA (◎)

Communication IB (◎)

Basic English UsageI(◎)

Basic English UsageII (◎)

(1T)Information and Data Science Courses ( )

Communication IIA (◎)

Communication IIB(◎)

Technical English(◎)

Training of Biotechnology I(◎)

Experiments on Biotechnology II (◎)

Graduation Thesis(◎)

Graduation Thesis(◎)

Group Discussion of Current Biotechnology Topics(◎)

(Ex) Liberal Arts Education Subjects

Basic Specialized Subjectie.4 6 /P 2 -6